Small to Medium Business Solutions

Millions Connected. Millions Saved. It's Your Turn.

Network Appliances
Power over Ethernet Surveillance, Switching & Wireless

Solutions Brief
November, 2006

Abstract

As the world goes wireless, with Wi-Fi access points (APs), IP cameras and VoIP phones appearing everywhere, new wiring and equipment challenges are arising. Creative network architects want to put wireless APs in hard to reach places, at temporary work sites and trade shows, and beyond the reach of passers by. Without a local power source, however, the challenges are many. Electricians are expensive, it takes time to wire and install electrical outlets, and standard electrical equipment can be bulky and obtrusive.

Power over Ethernet (PoE) switches, adapters, and devices are offering solutions. PoE equipment channels power over twisted pair wires in standard Ethernet cabling, rendering electrical wiring obsolete for a variety of applications. Wi-Fi APs, IP video surveillance cameras, VoIP phones and much more can be placed where needed - often in ceiling tiles, or high on a wall - without concern for the proximity to power. Fast, cheap, and less obtrusive installations can now be performed without electricians or extensive wiring work. This solution brief examines PoE, its numerous advantages and D-Link's specific PoE solutions and products.

D-Link
Building Networks for People

PoE Definitions, Technology, and Advantages

Basically, PoE equipment (switches, Midspans, adapters and PoE devices) eliminates the need for traditional power outlets for specific network applications. The switches and Midspans convert standard 110-240VAC power into low-voltage DC that runs over existing LAN cabling (CAT5 or better) to power up IEEE 802.3af compliant network accessories (or non-PoE accessories connected via terminal adapters). 802.3af is the IEEE standard for powering network devices via Ethernet cable.
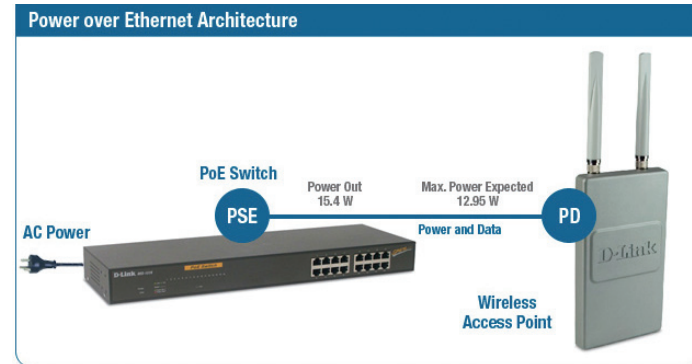

Figure 1: *Power Over Ethernet provides up to 12.95W to an Ethernet device while still supporting 100m spans.*

802.3af supplies 48 volts over four and eight wire twisted pair cables. Eight wire cables send power over unused twisted pairs, while four wire cables send power over the same pair as the data. Typically, pins 4,5 and 7,8 are used to carry power in the eight-wire set up. Alternatively, pins 1,2 and 3,6 can be used to piggyback power over active data wires. The end result is that only an Ethernet cable needs to be connected to the device to provide both power and data. The device needs to be able to accept power via its own Ethernet jack, but there are adapters that will power non-PoE-enabled devices. The typical PoE configurations or cases are:

- **PoE switch and PoE device -**
  A PoE-enabled device takes power and data from a single Ethernet cable and an attached PoE switch.

- **PoE switch, PoE terminal adapter, and non-PoE device -**
  A PoE terminal adapter splits the power out of and Ethernet cable (fed power by a PoE switch) and connects to a standard power input on the networked device via an electrical bridge cable. A separate Ethernet cable is then used to connect the data portion of the feed from the terminal adapter.

- **Non-PoE switch, PoE Midspan and PoE device -**
  A PoE Midspan with multiple PoE ports attaches to a standard non-PoE switch, enabling PoE devices to attach to the network from the Midspan.

- **Non-PoE switch, PoE Midspan, and non-PoE device -**
  A PoE Midspan with multiple PoE ports attaches to a standard non-PoE switch. Non-PoE devices connect to the Midspan via a terminal adapter that splits power and data out of the cable just like the second scenario described above.

- **PoE adapter, non-PoE network source, PoE device -**
  A PoE adapter plugs into the wall and into a non-powered, standard network connection. The adapter then injects power and data into the Ethernet cable.
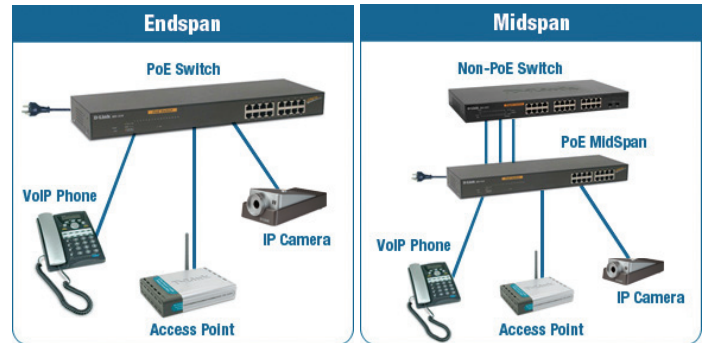

Figure 2: *PoE Switches provide Endspan power, while PoE Midspan devices can be used with non-PoE switches to inject power.*

PoE switches can deliver power via active or spare wires, however Midspans can only deliver power over spare wiring pairs. Only one switch or Midspan power delivery mechanism - spare or active - can be used to deliver power to devices once the choice is made. Also, Midspans are not able to deliver PoE via 1000BASE-T connections, while PoE switches can.
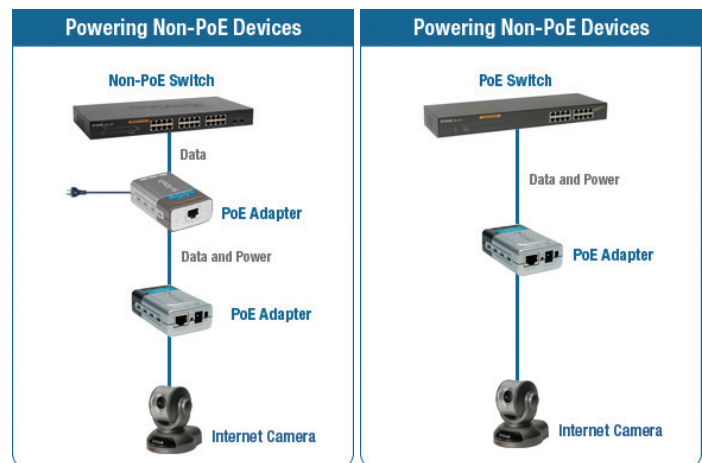

Figure 3: *Non-PoE devices can use PoE adapters with either PoE switches or non-PoE switches.*

It should be noted that PoE switches and Midspans deliver up to 15.4W per port (12.95W after cable losses), so device options are limited in that sense. For example, a typical PoE switch can support multiple devices like IP phones, wireless APs, IP cameras, and ID Card Readers (depending upon ports available), but something like a laptop would present problems because laptops typically consume more power than the 12.95W available from the PoE port. The IEEE 802.3at task force is working on enhancements to the existing PoE standard to provide at least 30W as well as possibly supporting Midspans for 1000Base-T and 10GBase-T links.

Finally, with PoE, a set of devices can be contained on a single power system, allowing isolation of complete systems with UPS power back up support (especially important for VoIP, building control, and security camera applications).

Applications

Because of the many benefits offered by PoE, applications continue to proliferate. The following list includes both typical and newer, lesser known applications:

- VoIP telephones
- Wireless access points
- Video surveillance cameras
- Building management systems
- Digital signs
- Remote video kiosks
- Electronic badge readers
- Magnetic card readers
- Magnetic door locks

With PoE, full-featured VoIP telephones can be situated anywhere CAT5 cable can be run. UPS power back-up ensures that they stay up even in the most challenging conditions. Similarly, Wireless access points can be placed in remote and difficult to reach locations. D-Link wired several baseball stadiums with Wi-Fi APs this way. The APs were out of the reach of fans and vandals yet fully connected to the network and powered up. Video surveillance cameras and building management systems can be placed in all kinds of locations without any thought to electrical infrastructure. Digital signage and remote video kiosks can be easily set up at trade shows and temporary events without worrying about access to traditional power outlets. IP connected electronic badge readers, magnetic card readers, and magnetic door locks enable centralized control and auditing of personnel movements, safety protocols, and security access. Again, the ability to place these devices anywhere without hassling with electrical wiring reduces costs, saves time, and makes mobile/trade event set up very easy.
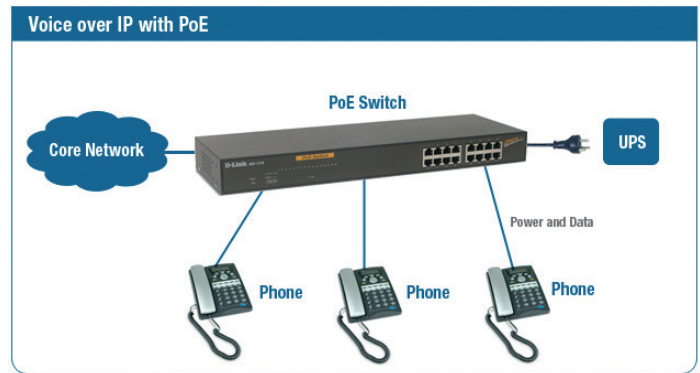

Figure 4: *PoE allows IP Phones to be powered from a central UPS for operation even during power failures.*

Outdoor Wireless and Ceiling Mounted Wireless APs

PoE technology has also been a growing influence recently on the design of wireless LANs. With any wireless LAN installation, the performance of the wireless LAN is often tied to the quality of the wireless coverage in the intended coverage area. One or multiple site surveys are often performed to aid in determining where best to position wireless access points. There are times however, when the results of a site survey suggest the optimal location of wireless access points to provide the best coverage is not feasible because of power constraints. The flexibility of having PoE-enabled wireless access points helps in the deployment of configurations yielding the most optimal wireless coverage. A prime example is in the placement of wireless access points in outdoor environments. Placement of the access point in outdoor configurations is no longer restricted because of the need for AC power outlets.

Figure 5: *Power over Ethernet allows more flexibility in Wireless Access Points placement.*

Physical security and device integrity protection are other factors that must be considered in wireless LAN equipment deployment. Obviously wireless access points would be best in locked secure locations. Sometimes however, this is just not feasible. PoE can offer some degree of flexibility with regard to access point placement. To help deter people from tampering with wireless access points, PoE allows mounting the equipment on ceilings, in the plenum space above dropped ceilings, high on walls or in hallways. It's rare that AC power outlets exist in these desirable mounting locations. PoE provides the flexibility to mount the wireless access points where needed, not where the AC power outlets dictate.
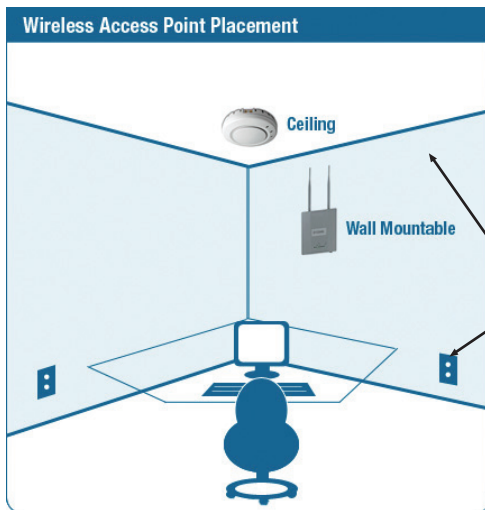

Figure 6: PoE enables Ceiling Mounting or Wall Mounting where AC Power Outlets are not available.

IP Security Cameras

Another networking application gaining momentum within business environments is IP based monitoring and surveillance. Businesses using LAN attached cameras can monitor for production or security purposes. Monitoring applications can be set up to watch production line or assembly line processes and machinery. Alternatively, surveillance applications can be implemented to aid in protecting a company, its customers, and its assets on a 24x7 basis.

Very similar to wireless networking, the placement and location of IP cameras is very critical to the effectiveness of the application. Camera placement in security applications should be in inconspicuous locations that still allow visibility to high traffic or high value areas. In order to get those IP cameras in the most optimal location for monitoring, their location must not be restricted by the location of AC power outlets. PoE cameras enable much more flexibility in camera location and optimize the monitoring application.
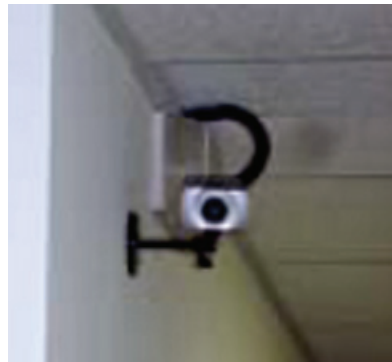

Figure 7: IP camera installation is quicker and less expensive with PoE.

In most security monitoring applications, the perimeter area immediately outside buildings is one of the most important to monitor. To effectively monitor the perimeter or monitor outdoor assets, it may be necessary to place cameras outdoors. Having PoE cameras and switches enables prime camera placement and viewing angles by eliminating the need for nearby AC power sources.

Future/Conclusion

With PoE support for 10/100/1000BASE-T interfaces, enterprises can flexibly deploy next generation devices without worrying about exorbitant resource, budget and timing expenditures. As Gigabit Ethernet becomes more widely adopted, more compelling applications will come to market and new productivity, security and communication advances will inevitably follow. The future of this market is bright and growing brighter as IP intelligence and functionality makes their way into all kinds of appliances, equipment, and practical scenarios.

D-Link Power Over Ethernet Solutions

For more detailed information about Power over Ethernet products from D-Link please visit the D-Link website at:

http://www.dlink.com/PoE

Or contact us directly:

1-800-326-1688

D-Link Power Over Ethernet Solutions

D-Link Switch - *xStack*™ DWS-3227P -
Integrated wired and wireless switching solution supports 24 PoE ports, supplying up to 15.4W of power per port to 802.3af compliant devices or terminal adapters. The switch can support up to 25 APs (non-PoE and/or PoE) and up to 1500 WLAN clients. The ports can support devices other than APs, as well. *NOTE: The DXS-3227P provides all the same features except for the wireless switching support, and can be upgraded to a DWS with licensed firmware.*

D-Link Switch - *xStack*™ DES-3828P -
The DES-3828P is a fully managed Layer 3 switch that provides 24 10/100Mbps Fast Ethernet ports, each capable of PoE and two combination SFP/1000BASE-T Gigabit Ethernet ports. Two fixed 1000BASE-T ports in the back-panel can provide a dedicated trunk connection between devices or core switches.

D-Link Wireless Switching - *AirPremier® MobileLAN*™ DWS-1008 -
Wireless LAN switch designed for easy user installation and operation while supporting advanced wireless switch features such as secure mobility, policy enforcement, AAA, and 802.1x offload capabilities. It includes eight 10/100Mbps ports with integrated PoE.

D-Link Switch - DES-3010PA -
High performance Layer 2 switch featuring a small 11" form factor chassis, 8 10/100Mbps ports that support PoE devices and a copper 1000BASE-T port for easy uplinks to standard Gigabit copper switches.

D-Link Switch - *Web Smart* DES-1526 -
24 10/100BASE-TX Fast Ethernet ports, all of which support PoE, plus two combination ports providing fiber or copper Gigabit Ethernet.

D-Link Switch - *Web Smart* DES-1316 -
This unique switch is equipped with 16 10/100BASE-TX Fast Ethernet ports, 8 of which support PoE.

D-Link Midspan - DWL-P1012 -
12-port PoE Midspan designed specifically for business-class environments seeking to add secure and manageable power over LAN options.

D-Link PoE Terminal Adapters - DWL-P200 -
Power over Ethernet Adapter delivers data and electrical power to Ethernet-enabled devices using a single Ethernet cable. The unit plugs into a wall outlet and network source then delivers both power and data to a PoE device via a lone Ethernet cable.

D-Link PoE Terminal Adapters - DWL-P50 -
Power over Ethernet Adapter delivers power and data to a non-PoE device via a single CAT5 cable. It complements a PoE switch or Midspan, carrying power and data over long distances then separating the power from the data at the last few feet of the installation (before the non-PoE device). A bridge power cable is connected to the non-PoE device's native power connection port, and a CAT5 patch cable delivers pure data to the standard, non-PoE network jack on the device.

D-Link Power Over Ethernet Solutions *continued*

D-Link Wireless Access Points - DWL-8220AP -
Wireless Switch Dualband (802.11a/b/g) Access Point supports client access to the functions of the *AirPremier® MobileLAN*™ DWS-1008 Wireless Switch and PoE. DWL-8220APs have no locally stored configuration data, so they cannot be hacked.

D-Link Wireless Access Points - DWL-7230AP -
xStack™ Wireless Switch 802.11a/b/g Access Point with integrated PoE support for use with the *xStack*™ DWS-32xx family of Wireless switches.

D-Link Wireless Access Points - DWL-2230AP -
xStack™ Wireless Switch 802.11b/g Access Point with integrated PoE support for use with the *xStack*™ DWS-32xx family of Wireless switches.

D-Link Wireless Access Points - DWL-7200AP -
AirPremier® AG Wireless Access Point delivers PoE support and dualband, multimode performance on both the 802.11a and 802.11g bands.

D-Link Wireless Access Points - DWL-2200AP -
AirPremier® Wireless Access Point delivers wireless signals via D-Link 108G technology (supports 802.11 b/g). Integrated PoE support included.

D-Link Wireless Access Points - DWL-8200AP -
AirPremier® Plenum-rated 802.11a/g Managed Dualband Access Point includes integrated PoE and dualband coverage for 802.11a and 802.11 b/g bands with WDS (Wireless Distribution System) support.

D-Link Wireless Access Points - DWL-3200AP -
AirPremier® Plenum-rated 802.11g Managed Access Point delivers extremely reliable and manageable wireless performance and PoE and WDS (Wireless Distribution System) support.

D-Link Wireless Access Points - DWL-7700AP -
AirPremier® Wireless AG Outdoor AP/Bridge delivers 54Mbps wireless signals in both 802.11a and 802.11g, and it supports PoE.

D-Link Wireless Access Points - DWL-2700AP -
AirPremier® 802.11b/g Outdoor AP/Bridge delivers 54Mbps coverage in any outdoor environment, as well as PoE and WDS (Wireless Distribution System) support.

D-Link IP Camera - DCS-1110 -
10/100 Fast Ethernet PoE Internet Camera supports PoE, 0.5 Lux light sensitivity for minimal light settings.